

PCT

10/517831

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 03-067PCT	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/JP 03/13332	International filing date (day/month/year) 17/10/2003	(Earliest) Priority Date (day/month/year) 18/10/2002
Applicant  MITSUBISHI HEAVY INDUSTRIES, LTD.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 7 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (see Box II).

4. With regard to the title,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

VARIABLE NOZZLE TURBOCHARGER AND MANUFACTURING METHOD

5. With regard to the abstract,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☒ because this figure better characterizes the invention.

1  
☐ None of the figures.

## Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

An exhaust gas turbocharger with a fail-safe variable-nozzle mechanism. Even if wear of the drive ring supporting part increases, the drive ring can be supported on the nozzle mount on a second supporting part. This second supporting part enables the drive ring to be always supported rightly on the nozzle mount, and to prevent the occurrence of eccentric rotation or dropping out of the drive ring due to excessive wear of the drive ring supporting part. It also prevents the occurrence of reduction in engine performance due to malfunctions of the variable-nozzle mechanism and the occurrence of breakage of the variable-nozzle mechanism as has been experienced in the prior art. In another embodiment, the variable-nozzle mechanism assembly is constructed as a cartridge which can be easily incorporated in or removed from the turbocharger.

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/JP 03/13332

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims: it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claim : 1

A variable nozzle mechanism in an exhaust gas turbocharger in which a second supporting part is provided on the nozzle mount for supporting a drive ring for rotation when the wear/abrasion of a supporting part reaches a predetermined amount.

2. Claims: 2-12

A variable nozzle mechanism in an exhaust gas turbocharger which is constructed like a kind of cartridge.

# INTERNATIONAL SEARCH REPORT

National Application No

JP 03/13332

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 F01D17/16

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 F01D F02C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 226 444 A (GARRETT CORP) 24 June 1987 (1987-06-24) cited in the application the whole document	1
X	US 2 428 830 A (RUDOLPH BIRMANN) 14 October 1947 (1947-10-14) column 5, line 29 - line 53; figures 3,4	1
A	US 2002/098081 A1 (SCHACHERER ROLAND ET AL) 25 July 2002 (2002-07-25) the whole document	1

-/--

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*8\* document member of the same patent family

Date of the actual completion of the international search

28 May 2004

Date of mailing of the international search report

18.06.2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

de Rooij, M

## INTERNATIONAL SEARCH REPORT

International Application No.

JP 03/13332

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 679 984 A (SWIHART WILLIAM R ET AL) 14 July 1987 (1987-07-14)	1
X	abstract; claims 24-28; figures 2-7 column 2, line 57 - line 68 column 3, line 23 - column 4, line 26 column 4, line 49 - line 65	2,8-12
X	EP 1 236 867 A (MITSUBISHI HEAVY IND LTD) 4 September 2002 (2002-09-04) paragraph '0025! - paragraph '0032!; figures 1,7	2,7,9,10
X	US 4 770 603 A (ENGELS BERTOLD ET AL) 13 September 1988 (1988-09-13) figure 1 column 1, line 5 - line 20 column 2, line 3 - line 21 column 3, line 5 - line 12 column 5, line 59 - column 7, line 7	2,3
X	US 5 146 752 A (BRUESTLE CLAUS) 15 September 1992 (1992-09-15) column 2, line 43 - column 3, line 18; figures 1,4,5	2,9-12
X	EP 1 120 547 A (MITSUBISHI HEAVY IND LTD) 1 August 2001 (2001-08-01) paragraph '0026! - paragraph '0029!; figures 2-5	2,9
E	EP 1 394 363 A (BORG WARNER INC) 3 March 2004 (2004-03-03) abstract; figures 1-4 paragraph '0019! - paragraph '0022! paragraphs '0029!, '0032!	2,3,7,9, 11,12

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

/JP 03/13332

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0226444	A	24-06-1987	AT 62976 T BR 8604833 A CA 1270120 A1 DE 3678914 D1 EP 0226444 A2 JP 62139931 A US 4804316 A	15-05-1991 07-07-1987 12-06-1990 29-05-1991 24-06-1987 23-06-1987 14-02-1989
US 2428830	A	14-10-1947	NONE	
US 2002098081	A1	25-07-2002	DE 10104176 A1 EP 1227221 A2	25-07-2002 31-07-2002
US 4679984	A	14-07-1987	JP 62139932 A	23-06-1987
EP 1236867	A	04-09-2002	JP 3482196 B2 JP 2002256879 A BR 0200633 A EP 1236867 A2 US 2003077167 A1	22-12-2003 11-09-2002 10-12-2002 04-09-2002 24-04-2003
US 4770603	A	13-09-1988	DE 3541508 C1 AT 41474 T BR 8605750 A DE 3662423 D1 EP 0224083 A1 JP 1854562 C JP 5065694 B JP 62162730 A	05-02-1987 15-04-1989 28-07-1987 20-04-1989 03-06-1987 07-07-1994 20-09-1993 18-07-1987
US 5146752	A	15-09-1992	DE 3941715 A1 DE 59003885 D1 EP 0433560 A1	20-06-1991 27-01-1994 26-06-1991
EP 1120547	A	01-08-2001	JP 2001207856 A BR 0102014 A CN 1307172 A EP 1120547 A2 US 2001013339 A1	03-08-2001 23-07-2002 08-08-2001 01-08-2001 16-08-2001
EP 1394363	A	03-03-2004	EP 1394363 A1 JP 2004132363 A	03-03-2004 30-04-2004

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☒ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**